

REMARKS

Claims 18-34 are now pending in the patent application.

**Claim Rejection-35 U.S.C §112**

Claims 1-17 are rejected as being indefinite for the reasons set forth on pages 2-3 of the office action.

Claims 1-17 are cancelled, and claims 18-34 are substituted in their place. The new claim set corresponds to the claims pending in the corresponding EP-application.

In particular, the claims have been clarified by including reference numbers that correspond to the steps in the figures to improve readability. Secondly, the limitations of claim 1 have been restructured in the new claim 18 to further clarify the method especially regarding what information is received in the first sub-process from the second sub-process.

It is respectfully submitted that the amendments to the claims have support in the patent application, as follows:

Support for the phrase "(Step 12, 23, 72) having first variables (X<sub>1</sub>)" and "(Step 11, 21, 22, 71, 73) having second variables (X<sub>2</sub>)" can be found in old claim 1 and on page 11, line 17 – 18. Reference can be made to accompanying Tables 1 – 2 and Figures 1, 2, 5.

Support for the phrase "said first sub-process being performed after said second sub-process in said process chain, said method comprises the steps of:" can be found in old claim 1

and on page 11-13, lines 15 – 4. Reference can be made to accompanying Tables 1 – 2 and Figures 1, 2, 5.

Support for the phrase "-collecting data including said second variables and calculating a multivariate sub-model based on said collected data comprising weighted averages (t11, t12, t41, t42, t5, t7, t8, t9) for said second variables for the at least one second sub-process (Step11, 21, 22, 71, 73)," can be found in old claim 1 and on page 11-13, lines 15 – 4.

Reference can be made to accompanying Tables 1 – 2 and Figures 1, 2, 5. Page 8, lines 19 – 23 disclose specifically "weighted averages (t11, t12, t41, t42, t5, t7, t8, t9)"

Support for the phrase "collecting data including said first variables" can be found in old claim 1 and on page 11, lines 15 – 21 and Tables 1 and Figures 1, 2, 5.

The other claims have been amended also falls within the above support.

It is respectfully submitted that all amendments to the claims are directly and unambiguously derivable from the description. Thus, the amendments are made in such a way that the application contains subject matter which does not extend beyond the content of the application, as filed.

Moreover, it is noted that the order of the variables  $X_1$  and  $X_2$  has been reversed.

Support for the sentence "(Step 12, 23, 72) having first variables ( $X_2$ )" and "(Step11, 21, 22, 71, 73) having second variables ( $X_1$ )" can be found in old claim 1 and on page 12, line 3 – 4 and page 12 line 20 – 21. The accompanying Table 2 and Figures 1, 2, 5 also supports the relationship of ( $X_1$ ) and ( $X_2$ ) in view of the different steps.

**Claim Rejection-35 U.S.C §101**

Claims 1-11 and 13-17 are rejected under 35 USC section 101 as being unpatentable since they are devoid of results.

It is respectfully submitted that the subject matter of claim 12 was not rejected and contains the wording "to perform on-line monitoring in the process chain." The claimed method for monitoring of and fault detection in an industrial process may be used for monitoring in such a process chain. In view this, newly claim 18 now includes the language "method for monitoring of and fault detection in a process chain in an industrial process." It is respectfully submitted that a person skilled in the art would appreciate that the useful end result of the claimed method and apparatus is for monitoring of and fault detection in a process chain in an industrial process.

Moreover, new claim 29 recites the subject matter of original claim 12 to make clear that the method includes using a number of multivariate sub-model observations comprising a prediction set to perform on-line monitoring in the process chain.

**Claim Objection-37 C.F.R 1.75**

The specification has been amended to include the language of claims 16 and 17 in view of the objection to these claims.

**Claim rejection-35 U.S.C §102**

Claims 1-17 are rejected based on EP-B1-0 537 041 (D1), which is a foreign language document. The cited prior art document is not in the English language, although an English language translation of the abstract was found on the Internet, copy attached.

Claims 1-17 are replaced by claims 18-34. These claims are deemed patentable over the cited prior art for all the reasons set forth below:

The present invention relates to monitoring and fault detection in a process chain in an industrial process, especially being able to deal with the interdependency of the variables in two sub-processes.

Sequential manufacturing makes for a strong need of tracking quality data through the whole manufacturing tree, assuring that all components and sub-components, as well as their combinations, have adequate quality, faults are early (high up) discovered in the tree, etc.. Examples of products assembled in such a way include cars, computers, and telephone exchanges. The same approach applies to a product manufactured in several steps without assembly, e.g., a pharmaceutical tablet, a roll of printing paper, or a wafer in a semiconductor process.

The method can be used in all possible applications such as, pharma production, sequential process of synthesis, purification, milling, granulation, drying, blending, tableting, coating, packaging, etc.

The cited prior art EP-B1-0 537 041 (D1) merely discloses a method for monitoring sensors of an industrial process that does not use multivariate models, as claimed.

For example, the quality of intermediate and end products is in D1 described by values of a set of variables, the product specification. The specifications are often used in a univariate mode, i.e. they are checked individually for conformation within the specification value range. This gives rise to both false negative and false positive classification, since the quality variables very rarely are independent in practice, but are treated as if they were, i.e. univariately.

One of the main difference of the technique recited in the new claim 18 versus that disclosed in document D1 is that the mathematical model used is not multivariate, as claimed. The weighted averages recited in claim 18 comprises multivariate information of several parameters.

It is respectfully submitted that document D1 does not teach or suggest anything about the weighted information; and more specifically nothing is disclosed in D1 about receiving said information from process  $P_1$ , including said information together with weighted information about the variables in process  $P_2$ , and then calculating a new multivariate sub-model to deal with the variables due to their interdependency.

Because of this fundamental difference, it is possible to monitor and fault detect an industrial process chain using the claimed invention comprising at least two sub-process and reducing the risk of false approval and deal with the interdependency of the variables in the two sub-processes.

The inventors have found that in an industrial process comprising at least two process steps arranged in a process chain the variables disclosing the parameters such as product quality in each process step are interdependent and can thus not be monitored individually.

In effect, the claimed solution is to monitor and fault detect in a process chain in an industrial process chain using a method to calculate a multivariate sub-model and transferring the weighted information about the variables in the second sub-process to a first sub-process and said first sub-process further receives information about the variables in the first sub-process where after calculating a new multivariate sub-model based on said collected data including said variables in the first sub-process and said weighted averages of the variables from the second sub-process.

It is respectfully submitted that, even if one of ordinary skill in the art were to use a multivariate model in view of the process  $P_1$ - $P_n$  and the predictions of the variables in the processes, one would not reach the present solution since no weighted information (multivariate) about the variables in process  $P_1$  is received in  $P_2$  when calculating such multivariate model.

Accordingly, it is respectfully submitted that one of ordinary skill in the art man would not arrive at the present invention after reading document D1.

Therefore, it is respectfully submitted that new independent claims 18 and 30 are novel and non obvious in view of D1.

The remaining claims depend from these independent claims, contain all the limitations thereof, and are believed patentable for all the same reasons.

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Reconsideration and early allowance are earnestly requested.

Respectfully submitted,  
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